AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listing, of claims in the application:

Listing of Claims:

[Claim 1]

(Currently amended) A chip design verification apparatus for verifying a target unit including at least one hardware block, the chip design verification apparatus comprising:

a computer including at least one software block in data communication with the at least one hardware block, and which verifies an operation between the at least one hardware block and the at least one software block, the computer comprising:

an interface means of transmitting output data of the hardware block, determining whether output data of the software block which comprises a system clock count value of a chip design verification program when the output value of the software block is changed is valid, and applying only valid output data of the software block to the hardware block;

a storage means of storing the at least one software block and a chip design verification program the chip design verification program for verifying the at least one software block; and

a controller for transmitting the output data of the software block generated by an operation of executing the chip design verification program to

Reply to Final Office Action of February 5, 2009

the interface means, determining whether the output data of the at least one

hardware block input via the interface means is valid, and applying only valid

output data of the at least one hardware block to the at least one software

block.

[Claim 2]

(Original) The chip design verification apparatus according to claim 1,

wherein the chip design verification program has a graphic user interface, and allows

data transceived by executing the chip design verification program to be displayed via

the graphic user interface.

[Claim 3]

(Original) The chip design verification apparatus according to claim 1,

wherein the chip design verification program obtains a multi clock setting value for

operating the software block and the hardware block, and stores the value in the

interface means.

[Claim 4]

(Original) The chip design verification apparatus according to claim 3,

wherein the interface means has a clock controller of generating multi clocks in

response to the multi clock setting value and a system clock of the interface means

and applying the multi clocks to the hardware block.

SPX200412-0010PCT/US

Page 3 of 31

SUN-0166

[Claim 5]

(Original) The chip design verification apparatus according to claim 4, wherein the output data of the hardware block has an output value of the hardware block changed in response to the multi clocks applied from the interface means, and a system clock count value of the interface means when the output value of the hardware block is changed.

[Claim 6]

(Original) The chip design verification apparatus according to claim 5, wherein the valid output data of the hardware block is an output value of the hardware block when the system clock count value of the interface means is equal to or smaller than the system clock count value of the chip design verification program, and is an output value of the hardware block when the output value of the software block is not changed even when the system clock count value of the chip design verification program is increased so as to be equal to the system clock count value of the interface means after determination that the system clock count value of the interface means is greater than the system clock count value of the chip design verification program.

[Claim 7]

Response to Final Office Action filed: June 5, 2009

Reply to Final Office Action of February 5, 2009

(Original) The chip design verification apparatus according to claim 3,

wherein the chip design verification program generates multi clocks in response to the

multi clock setting value and the system clock of the chip design verification program

to apply the multi clock to the software block.

[Claim 8]

(Currently amended) The chip design verification apparatus according to

claim 7, wherein output data of the software block has an further comprises the output

value of the software block changed in response to the multi clocks applied from the

chip design verification program, and a system clock count value of the chip design

verification program when the output value of the software block is changed.

[Claim 9]

(Original) The chip design verification apparatus according to claim 8.

wherein the valid output data of the software block is an output value of the software

block when the system clock count value of the chip design verification program is

equal to or smaller than the system clock count value of the interface means, and is an

output value of the software block when the output value of the hardware block is not

changed even when the system clock count value of the interface means is increased

so as to be equal to the system clock value of the chip design verification program

after determination that the system clock count value of the chip design verification

program is greater than the system clock count value of the interface means.

SPX200412-0010PCT/US

SUN-0166

Page 5 of 31

【Claim 10】

(Original) The chip design verification apparatus according to claim 7, wherein the software block has a test-bench, and the test-bench supplies the multi clock setting value to the chip design verification program and operates in response to the multi clocks of the chip design verification program instead of the multi clocks owned by the test-bench itself.

[Claim 11]

(Currently amended) A data communication method for a chip design verification apparatus for verifying a target unit including at least one hardware block including a computer, the computer having at least one software block, a chip design verification program, and a storage means of storing input and output data, and an interface means of interfacing with the software block and the hardware block, the method comprising:

a software side operation step of transmitting output data generated by the operation of the software block to the interface means, determining whether the output data of the hardware block which comprises a system clock count value of the chip design verification program when the output value of the software block is changed received via the interface means is valid by executing the chip design verification program, and applying only the valid output data of the hardware block to the software block; and

Response to Final Office Action filed: June 5, 2009

Reply to Final Office Action of February 5, 2009

a hardware side operation step of transmitting output data generated by the

operation of the hardware block to the software block, determining whether the

output data of the software block received is valid by executing the chip design

verification program in the interface means, and applying only the valid output data

of the software block to the hardware block.

[Claim 12]

(Original) The method according to claim 11, further comprising:

a step of allowing the chip design verification program to obtain a multi clock

setting value to be provided to the interface means, and generate multi clocks in

response to a system clock of the chip design verification program and the multi clock

setting value to be applied to the software block; and

a step of allowing the interface means to generate multi clocks in response to

the system clock of the interface means and the multi clock setting value to be applied

to the hardware block.

[Claim 13]

(Original) The method according to claim 12, wherein the output data of the

hardware block has an output value of the hardware block changed in response to the

multi clocks applied from the interface means, and a system clock count value of the

interface means when the output value of the hardware block is changed.

SPX200412-0010PCT/US

SUN-0166

Page 7 of 31

Response to Final Office Action filed: June 5, 2009

Reply to Final Office Action of February 5, 2009

[Claim 14]

(Original) The method according to claim 13, wherein the valid output data of

the hardware block is an output value of the hardware block when the system clock

count value of the interface means is equal to or smaller than the system clock count

value of the chip design verification program, and is an output value of the hardware

block when the output value of the software block is not changed even when the

system clock count value of the chip design verification program is increased so as to

be equal to the system clock count value of the interface means after determination

that the system clock count value of the interface means is greater than the system

clock count value of the chip design verification program.

[Claim 15]

(Currently amended) The method according to claim 14, wherein output data

of the software block has an output value of the software block changed in response

to the multi clocks applied from the chip design verification program, and a system

elock count value of the chip design verification program when the output value of

the software block is changed.

SPX200412-0010PCT/US SUN-0166 Page 8 of 31

Response to Final Office Action filed: June 5, 2009

Reply to Final Office Action of February 5, 2009

[Claim 16]

(Original) The method according to claim 15, wherein the valid output data of

the software block is an output value of the software block when the chip design

verification program is equal to or smaller than the system clock count value of the

interface means, and is an output value of the software block when the output value of

the hardware block is not changed even when the system clock count value of the

interface means is increased so as to be equal to the system clock value of the chip

design verification program after determination that the system clock count value of

the chip design verification program is greater than the system clock count value of

the interface means.

[Claim 17]

(Original) The method according to claim 16, wherein the software side

operation step includes:

a step of initiating an operation of receiving output data of the hardware via

the interface means by executing the chip design verification program:

a step of confirming that the valid output data of the hardware block is

received and inputting the output data to the software block, when the received

system clock count value of the interface means is equal to or smaller than the system

clock count value of the chip design verification program, or when the output value of

the software block is not changed even when the received system clock count value of

the interface means is greater than the system clock count value of the chip design

SPX200412-0010PCT/US

SUN-0166

Page 9 of 31

Response to Final Office Action filed: June 5, 2009

Reply to Final Office Action of February 5, 2009

verification program to cause the system clock count value of the chip design

verification program to be increased so as to be equal to the received system clock

count value of the interface means:

a step of transmitting the output data of the software block to the interface

means when the output value of the software block is changed before the system

clock count value of the chip design verification program is increased so as to be

equal to the received system clock count value of the interface means; and

a step of initializing the increased system clock count value of the chip design

verification program when the input step or the transmission step is completed, and

increasing the system clock count value of the chip design verification program while

monitoring whether the output value of the software block is changed.

[Claim 18]

(Original) The method according to claim 17, wherein the input step includes:

a step of inputting the received output value of the hardware block to the

software block as the valid output data of the hardware block when the received

system clock count value of the interface means is equal to or smaller than the system

clock count value of the chip design verification program;

a step of increasing the system clock count value of the chip design

verification program while confirming whether the output value of the software block

is changed when the received system clock count value of the interface means is

greater than the system clock count value of the chip design verification program; and

SPX200412-0010PCT/US

SUN-0166

Page 10 of 31

Reply to Final Office Action of February 5, 2009

a step of inputting the received output value of the hardware block to the

software block as the valid output data of the hardware block when the output value

of the software block is not changed until the increased system clock count value of

the chip design verification program is greater than the received system clock count

value of the interface means.

【Claim 19】

(Original) The method according to claim 18, wherein the input step further

includes:

a step of displaying the valid output data of the hardware block by executing

the chip design verification program.

[Claim 20]

(Original) The method according to claim 17, wherein the transmission step

includes:

a step of increasing the system clock count value of the chip design

verification program while confirming whether the output value of the software block

is changed, when the received system clock count value of the interface means is

greater than the system clock count value of the chip design verification program; and

a step of transmitting the output data of the software block to the interface

means when the output value of the software block is changed in the case that the

SPX200412-0010PCT/US SUN-0166 Page 11 of 31

Response to Final Office Action filed: June 5, 2009

Reply to Final Office Action of February 5, 2009

increased system clock count value of the chip design verification program is equal to

or smaller than the received system clock count value of the interface means.

[Claim 21]

(Original) The method according to claim 20, wherein the transmission step

further includes:

a step of displaying the valid output data of the software block by executing

the chip design verification program.

[Claim 22]

(Original) The method according to claim 12, wherein the software block has

a test-bench, and the test-bench supplies the multi clock setting value to the chip

design verification program and operates in response to the multi clocks of the chip

design verification program instead of the multi clocks owned by the test-bench itself.

[Claim 23]

(Original) The method according to claim 16, wherein the hardware side

operation step includes:

a step of initiating an operation of receiving output data of the software via the

interface means by executing the chip design verification program;

a step of confirming that the valid output data of the software block is

received and inputting the output data to the hardware block, when the received

SPX200412-0010PCT/US

SUN-0166

Page 12 of 31

Response to Final Office Action filed: June 5, 2009

Reply to Final Office Action of February 5, 2009

system clock count value of the chip design verification program is equal to or

smaller than the system clock count value of the interface means, or when the output

value of the interface means is not changed even when the received system clock

count value of the chip design verification program is greater than the system clock

count value of the interface means to cause the system clock count value of the

interface means to be increased so as to be equal to the received system clock count

value of the chip design verification program;

a step of transmitting the output data of the hardware block to the chip design

verification program when the output value of the hardware block is changed before

the system clock count value of the interface means is increased so as to be equal to the received system clock count value of the chip design verification program; and

a step of initializing the increased system clock count value of the interface

means when the input step or the transmission step is completed, and increasing the

system clock count value of the interface means while monitoring whether the output

value of the hardware block is changed.

[Claim 24]

(Original) The method according to claim 23, wherein the input step includes:

a step of inputting the received output value of the software block to the

hardware block as the valid output data of the software block when the received

system clock count value of the chip design verification program is equal to or

smaller than the system clock count value of the interface means;

SPX200412-0010PCT/US

SUN-0166

Page 13 of 31

Response to Final Office Action filed: June 5, 2009

Reply to Final Office Action of February 5, 2009

a step of increasing the system clock count value of the interface means while

confirming whether the output value of the hardware block is changed when the

received system clock count value of the chip design verification program is greater

than the system clock count value of the interface means; and

a step of inputting the received output value of the software block to the

hardware block as the valid output data of the software block when the output value

of the hardware block is not changed until the increased system clock count value of

the interface means is greater than the received system clock count value of the chip

design verification program.

[Claim 25]

(Original) The method according to claim 24, wherein the transmission step

includes:

a step of increasing the system clock count value of the interface means

confirming whether the output value of the hardware block is changed, when the

received system clock count value of the chip design verification program is greater

than the system clock count value of the interface means; and

a step of transmitting the output data of the hardware to the chip design

verification program when the output value of the hardware block is changed in the

case that the increased system clock count value of the interface means is equal to or

smaller than the received system clock count value of the chip design verification

program.

SPX200412-0010PCT/US

SUN-0166

Page 14 of 31

Reply to Final Office Action of February 5, 2009

[Claim 26]

(Currently amended) A data communication method for a chip design

verification apparatus for verifying a target unit including a hardware block, including

a software block having at least one function block, a chip design verification

program for verifying operations of the software block and the hardware block, a

storage means of storing input and output data of the software block generated by

executing the chip design verification program, and an interface means of performing

an interfacing operation between the hardware block and the software block, the

method comprising:

a clock generation step of allowing the chip design verification program to

obtain a multi clock setting value to be provided to the interface means, and generate

multi clocks in response to a system clock of the chip design verification program and

the multi clock setting value to be applied to the software block, and allowing the

interface means to generate multi clocks in response to the system clock of the

interface means and the multi clock setting value to be applied to the hardware block;

a software side operation step of transmitting output data generated by the

operation of the software block operating in response to the multi clocks of the chip

design verification program to the interface means, determining whether the output

data of the hardware block received via the interface means is valid by executing the

chip design verification program, and applying only the valid output data of the

hardware block to the software block; and

SPX200412-0010PCT/US

SUN-0166

Page 15 of 31

Response to Final Office Action filed: June 5, 2009

Reply to Final Office Action of February 5, 2009

a hardware side operation step of transmitting output data generated by the

operation of the hardware block operating in response to the multi clocks of the

interface means to the software block, determining whether the output data of the

software block received is valid by executing the chip design verification program in

the interface means, and applying only the valid output data of the software block to

the hardware block, wherein the output data of the hardware block has an output

value of the hardware block changed in response to the multi clocks applied from the

interface means, and a system clock count value of the interface means when the

output value of the hardware block is changed.

[Claim 27] (Canceled)

[Claim 28]

(Currently amended) The method according to elaim 27 claim 26, wherein the

valid output data of the hardware block is an output value of the hardware block when

the system clock count value of the interface means is equal to or smaller than the

system clock count value of the chip design verification program, and is an output

value of the hardware block when the output value of the software block is not

changed even when the system clock count value of the interface means is greater

than the system clock count value of the chip design verification program to cause the

system clock count value of the chip design verification program to be increased so as

to be equal to the system clock count value of the interface means.

SPX200412-0010PCT/US

SUN-0166

Page 16 of 31

Reply to Final Office Action of February 5, 2009

[Claim 29]

(Original) The method according to claim 28, wherein output data of the

software block has an output value of the software block changed in response to the

multi clocks applied from the chip design verification program, and a system clock

count value of the chip design verification program when the output value of the

software block is changed.

[Claim 30]

(Original) The method according to claim 29, wherein the valid output data of

the software block is an output value of the software block when the chip design

verification program is equal to or smaller than the system clock count value of the

interface means, and is an output value of the software block when the output value of

the hardware block is not changed even when the system clock count value of the

chip design verification program is greater than the system clock count value of the

interface means to cause the system clock count value of the interface means to be

increased so as to be equal to the system clock count value of the chip design

verification program.

SPX200412-0010PCT/US SUN-0166 Page 17 of 31

Reply to Final Office Action of February 5, 2009

[Claim 31]

(Original) The method according to claim 30, wherein the software side

operation step includes:

a step of initiating an operation of receiving output data of the hardware via

the interface means by executing the chip design verification program;

a step of confirming that the valid output data of the hardware block is

received and inputting the output data to the software block, when the received

system clock count value of the interface means is equal to or smaller than the system

clock count value of the chip design verification program, or when the output value of

the software block is not changed even when the received system clock count value of

the interface means is greater than the system clock count value of the chip design

verification program to cause the system clock count value of the chip design

verification program to be increased so as to be equal to the received system clock

count value of the interface means;

a step of transmitting the output data of the software block to the interface

means when the output value of the software block is changed before the system

clock count value of the chip design verification program is increased so as to be

equal to the received system clock count value of the interface means; and

a step of initializing the increased system clock count value of the chip design

verification program when the input step or the transmission step is completed, and

increasing the system clock count value of the chip design verification program while

monitoring whether the output value of the software block is changed.

SPX200412-0010PCT/US

SUN-0166

Reply to Final Office Action of February 5, 2009

[Claim 32]

(Original) The method according to claim 31, wherein the input step includes:

a step of inputting the received output value of the hardware block to the

software block as the valid output data of the hardware block when the received

system clock count value of the interface means is equal to or smaller than the system

clock count value of the chip design verification program;

a step of increasing the system clock count value of the chip design

verification program while confirming whether the output value of the software block

is changed when the received system clock count value of the interface means is

greater than the system clock count value of the chip design verification program; and

a step of inputting the received output value of the hardware block to the

software block as the valid output data of the hardware block when the output value

of the software block is not changed until the increased system clock count value of

the chip design verification program is greater than the received system clock count

value of the interface means.

[Claim 33]

(Original) The method according to claim 32, wherein the input step further

includes:

a step of displaying the valid output data of the hardware block by executing

the chip design verification program.

SPX200412-0010PCT/US

SUN-0166

Page 19 of 31

Reply to Final Office Action of February 5, 2009

[Claim 34]

(Original) The method according to claim 31, wherein the transmission step

includes:

a step of increasing the system clock count value of the chip design

verification program while confirming whether the output value of the software block

is changed, when the received system clock count value of the interface means is

greater than the system clock count value of the chip design verification program; and

a step of transmitting the output data of the software block to the interface

means when the output value of the software block is changed in the case that the

increased system clock count value of the chip design verification program is equal to

or smaller than the received system clock count value of the interface means.

[Claim 35]

(Original) The method according to claim 34, wherein the transmission step

further includes:

a step of displaying the valid output data of the software block by executing

the chip design verification program.

[Claim 36]

(Original) The method according to claim 26, wherein the software block has

a test-bench, and the test-bench supplies the multi clock setting value to the chip

SPX200412-0010PCT/US

SUN-0166

Page 20 of 31

Response to Final Office Action filed: June 5, 2009

Reply to Final Office Action of February 5, 2009

design verification program and operates in response to the multi clocks of the chip

design verification program instead of the multi clocks owned by the test-bench itself.

[Claim 37]

(Original) The method according to claim 30, wherein the hardware side

operation step includes:

a step of initiating an operation of receiving output data of the software block

via the interface means by executing the chip design verification program;

a step of confirming that the valid output data of the software block is

received and inputting the output data to the hardware block, when the received

system clock count value of the chip design verification program is equal to or

smaller than the system clock count value of the interface means, or when the output

value of the interface means is not changed even when the received system clock

count value of the chip design verification program is greater than the system clock

count value of the interface means to cause the system clock count value of the

interface means to be increased so as to be equal to the received system clock count

value of the chip design verification program;

a step of transmitting the output data of the hardware block to the chip design

verification program when the output value of the hardware block is changed before

the system clock count value of the interface means is increased so as to be equal to

the received system clock count value of the chip design verification program; and

SPX200412-0010PCT/US SUN-0166

Page 21 of 31

Response to Final Office Action filed: June 5, 2009

Reply to Final Office Action of February 5, 2009

a step of initializing the increased system clock count value of the interface

means when the input step or the transmission step is completed, and increasing the

system clock count value of the interface means while monitoring whether the output

value of the hardware block is changed.

[Claim 38]

(Original) The method according to claim 37, wherein the input step includes:

a step of inputting the received output value of the software block to the

hardware block as the valid output data of the software block when the received

system clock count value of the chip design verification program is equal to or

smaller than the system clock count value of the interface means:

a step of increasing the system clock count value of the interface means while

confirming whether the output value of the hardware block is changed when the

received system clock count value of the chip design verification program is greater

than the system clock count value of the interface means; and

a step of inputting the received output value of the software block to the

hardware block as the valid output data of the software block when the output value

of the hardware block is not changed until the increased system clock count value of

the interface means is greater than the received system clock count value of the chip

design verification program.

SPX200412-0010PCT/US SUN-0166 Page 22 of 31

Reply to Final Office Action of February 5, 2009

[Claim 39]

(Original) The method according to claim 37, wherein the transmission step

includes:

a step of increasing the system clock count value of the chip design

verification program while confirming whether the output value of the hardware

block is changed, when the received system clock count value of the chip design

verification program is greater than the system clock count value of the interface

means; and

a step of transmitting the output data of the hardware to the chip

design verification program when the output value of the hardware block is changed

in the case that the increased system clock count value of the interface means is equal

to or smaller than the received system clock count value of the chip design

verification program.

SPX200412-0010PCT/US SUN-0166 Page 23 of 31